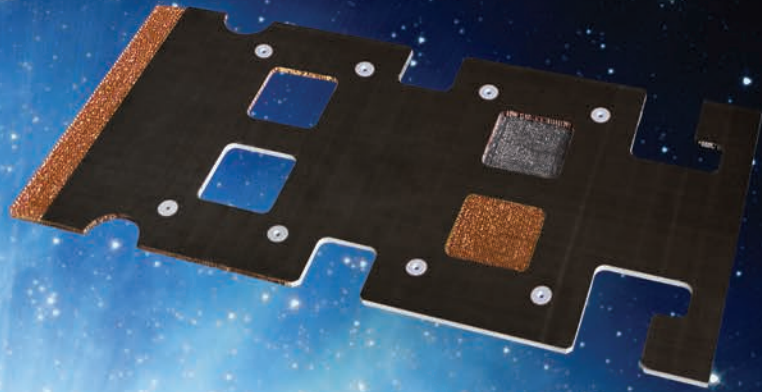


The Doorway

M.C. Gill Corporation Group of Companies

High-Performance Composite Products Since 1945 • www.mcgillcorp.com

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Vision...
Fabrication...
Reality!



The Process of Creation





The act of creation is as old as time and considered one of the significant characteristics that separates mankind from the animal kingdom. We celebrate creation through art, architecture, religion, science and almost every discipline practiced or taught. Whether by divine intervention, evolutionary selection or astrobiology, our ability to meld a collection of raw materials into something new, unique and functional has propelled us from primitive cave dwellers to modern scientists whose boundaries are limited by imagination alone.

Composites are materials made from two or more constituent materials with significantly different physical or chemical properties, that when combined, produce a material with characteristics different from the individual components.¹



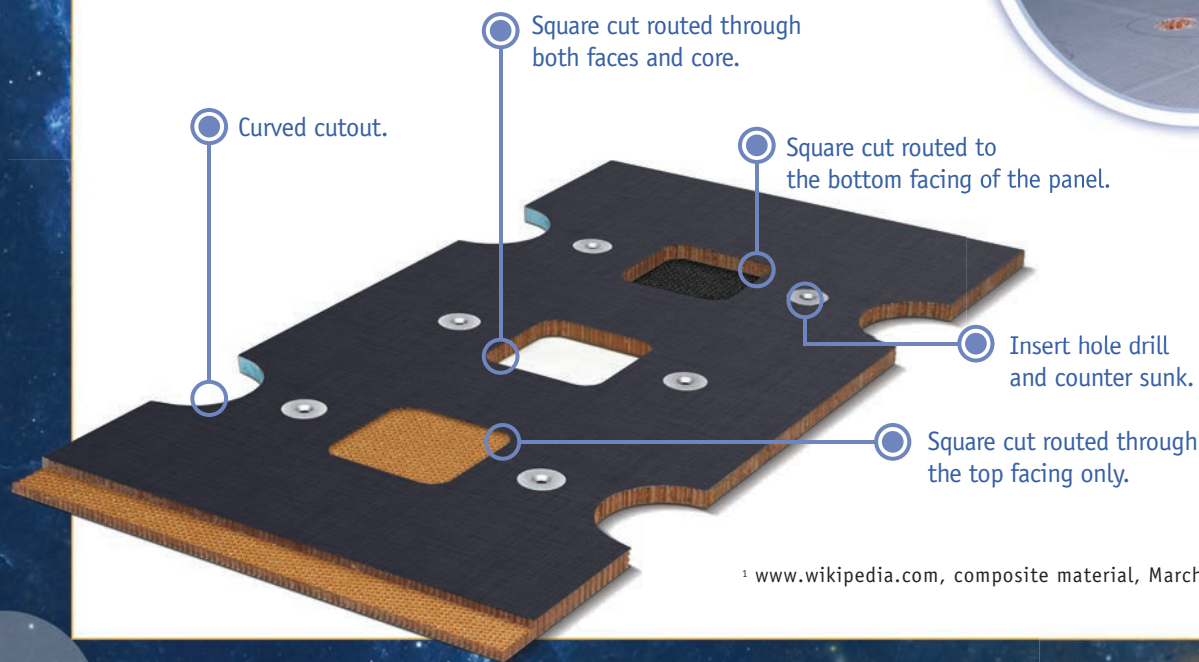
Composites first appeared on the scene over 6,000 years ago in the form of Egyptian bricks. Today, many people associate composites with an assortment of materials (fibers, metal or plastics) layered together and infused with resin.

M.C. Gill Corporation is a composites manufacturing pioneer with expertise in sandwich panels, laminates and honeycomb core. Since we sold our first cargo liner over 60 years ago, our scientists have been challenging the status quo with new products, additives and applications to turn the industry on its head. So if you already excel at something, why venture into uncharted waters? The corporation has always believed that if you are going to do something, do it right. That means reinvesting in the business with critical equipment and human resources. Not content to merely "create the stuff," over 23 years ago we began expanding our capabilities beyond just supplying raw materials.

In the early 1990s, M.C. Gill Corporation was approached by McDonnell Douglas with a request to provide fabricated flooring panels for the MD-80. We realized we would have a competitive edge by offering our customers *value-added* products and services that would include fabricated and machined parts and components. It was a natural segue to go from raw material manufacturer to fabricator with the in-house ability to profile panels (including cutting to shape, edge routing and filling, drilling, countersinking and installing inserts) that would conform to Douglas drawings. Creating a fabricated panel meant we could offer our customers a finished product that was essentially "drop-in ready."



CNC head, drilling and countersinking insert holes.



¹ www.wikipedia.com, composite material, March 19, 2013



Management was certain it could meet the production schedule and delivery requirements, so M.C. Gill Corporation accepted the challenge. A team was assembled to spearhead the project and, within the first five months, had earned a 99.7% acceptance rate. Within a few years, we were building fabricated floor panels for the MD-90 and MD-11, as well. Eager to stay at the forefront of our industry, the company launched a series of strategic acquisitions that resulted in the addition of subsidiaries with other unique fabrication capabilities.

There are many commonly practiced methods of fabrication, including:

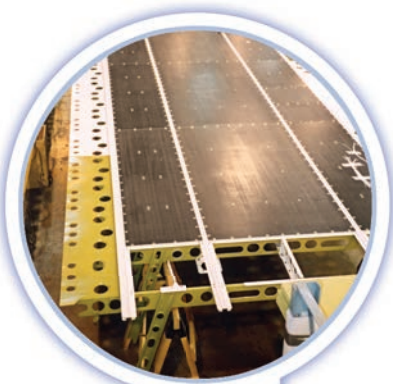
- Autoclave, compression, press, pressure bag, pultrusion, resin transfer and thermoplastic moulding
- Filament winding
- Vacuum infusion
- Wet lay-up

M.C. Gill Corporation's plants have the infrastructure and skill-set to fabricate, utilizing many of these processes.

Some of our CEO's earliest memories in the plant involve working with the production staff, learning the wet lay-up technique. In simple terms, wet lay-up involves combining fiber reinforcement and a matrix, which is then layered onto a form. The layers are then coated with a resin mixture and allowed to cure. Sometimes a heat source or vacuum bag is used during the curing process.

The finishing phase is where we make sure the parts will meet any specification, design or functional requirements before we send the parts to our customer. This value-added service means our customers receive parts that are ready for use upon receipt, which saves time and money.

Finishing activities might include CNC routing, painting, potting/inserts or preventative chemical coatings. Our plants offer the latest technology in computer-controlled CNC equipment, and quality control systems to ensure every part will pass rigid inspection related to the design specification.



Gillfab 4109 panels installed in the flooring assembly.

Inserts firmly set into the panel.



Alcore, Inc. in Maryland and Alcore Brigantine in France

are our corporation's *centers of excellence* for machining, profiling and heat-forming honeycomb. Both are qualified to multiple specifications and support major OEM programs with aircraft structure sub-assemblies (flaps, slats, spoilers, rudders, ailerons and engine nacelles). Their capabilities include:

- Planform detail trimming
- Chamfering
- Die cutting
- High-speed, hand routing of doublers or rebates
- Heat forming and heat soaking to contours
- Vacuum oven curing for splice, septum and skin bonding
- Potting and densification for hard attach points
- 3-axis and 5-axis CNC machining
- 3-D design and modeling



CNC
Machining

Insoleq (M.C. Gill Europe)

Our facility in Northern Ireland has a success story of its own. In 1990, it recognized the opportunity to expand its capabilities by offering fabrication services to one of its key clients. BAe was purchasing raw materials for the BAe Jetstream 31 (J31) and BAe Jetstream 41 (J41) aircraft. BAe had selected Gillfab 4017 and Gillfab 4004B.



Gillfab 4017 is a light-weight aircraft flooring panel made from unidirectional S-2 glass-reinforced epoxy facings bonded to aramid honeycomb core. It is recommended for heavy traffic areas because it offers fatigue and corrosion resistance, high-impact facings and high strength-to-weight ratio. Gillfab 4004B is a low-smoke sandwich panel made from unidirectional reinforced phenolic facings bonded to aramid honeycomb core. 4004B is a light-weight panel designed for flooring in commercial aircraft, offering high-impact and corrosion-resistant facings and low smoke emission in a fire.



Insoleq adopted the "cut and fold" technique for fabrication of essential J31 and J41 parts.

The "cut and fold" technique involves cutting slots across a honeycomb core sandwich panel, then folding the panel to create a non-linear shape. The larger the slot, the greater the angle possible created by the fold. By cutting multiple slots, fabricators can achieve a radiused fold that would be otherwise impossible. Once folded, a variety of adhesives are used to bond the material so it retains its shape. M.C. Gill Europe preferred the "cut and fold" technique over more expensive methods that would be tool- and equipment-intensive for creating 3D composite shapes. BAE engineers agreed, so work began on the J31 program using Gillfab 4017.

The J31 program required hockey stick kick boards, complex ECS duct, recessed aisle housings, main aisle floor hard skirts and simple box stowages.

The success of the initial production resulted in the addition of a complete set of main aisle steps created by a six-fold design of joined composite panels, replacing the original aluminum assembly that was made up of 35 different components.

To support the J41 program, Insoleq continued with the basic aisle concept from the J31 but were able to design and supply more complex 3-D side and center consoles (with stowages), forward furnishing Bulkheads (including recessed stowages and O2 bottle recesses), rudder pedal boxes and ramp panels (supported by mortise and tenon composite supports).

Insoleq technician inspects cut and fold.



Technician smooths the edge fill compound.



BAE SYSTEMS

In 2003, encouraged by the success of its collaboration with BAe, M.C. Gill Europe (Insoleq) entered into a design and build contract with Airbus to develop a robust, ultra-light-weight flooring system for the A380 forward fuselage/cockpit area. Gillfab 5509 was identified as the ideal product to provide the critical properties required by Airbus. Floor panel designs were developed to reduce the budgeted weight of the full work-package by 24%.

Gillfab 5509 is a low-smoke aircraft panel with facings made from phenolic resin reinforced with cross-plyed unidirectional carbon and Kevlar™ honeycomb core. Gillfab 5509 is light-weight, with facings that include a thin fiberglass layer to protect against galvanic corrosion.

Once again, M.C. Gill Europe (Insoleq) relied on the “cut and fold” process for the main electrical equipment area of the multi-level complex support structures that required frequent maintenance access in a limited space. Of primary concern were the issues of durability, shape and weight. M.C. Gill Europe’s solution included:

- Reinforcing individual parts by folding edges through 270° to form a “knuckle.”
- Folding extended panels to create integral legs/supports (avoiding the need for additional metal structures).
- 3- & 4-sided enclosures strong enough to double as access steps.
- Access hatches with formed, stiffened, edges.
- Step treads with hard-skirting risers (preventing damage to electrical equipment).



With this success, M.C. Gill Europe was eager to secure similar opportunities. In 2010, M.C. Gill Corporation began working with Israel Aerospace Industries, Inc. (IAI), on the Gulfstream G280 executive jet program. IAI challenged our designers to develop a technique for fitting out the side-walls and ceiling of a novel walk-in baggage bay where the finished appearance would be absolutely critical. Our competitors suggested the more expensive “wet lay-up” and/or autoclaved method. M.C. Gill Europe disagreed and, in turn, offered an economical solution which met the critical aesthetic and geometric specifications of the program. Included were:

- Multi-part stacked “S” section furnishing bulkheads with radiused folds and tapering width.
- Cranked (+90°/-90°) bulkheads including “C” cranked integral access doors.
- Folded parts with reduced sections to avoid clashes with structure or services.



Gulfstream® 

Although our earlier “cut and fold” techniques were applied to structural/functional and/or hidden (or finish-painted) parts, the parts for the G280 would be in full view of owners and operators of the aircraft. Obviously, hiding cut lines on visible faces would restrict the part design related to external closed folds. M.C. Gill Europe’s Technical Manager worked closely with IAI designers to qualify a new open-fold technique which allowed the creation of finished parts with both concave and convex folds (adding “Z” or “S” configurations to the existing portfolio of “C,” “L” and “U” cross sections). The process was based on opening (rather than closing) the cut lines to achieve a concave fold on the face side without any visual damage to the visible skin. A fill and replacement skin technique, fully qualified by mechanical and flammability testing, was used to close the back of the panel using Gillfab 4709WT. (See our Spring/Summer 2011 Doorway.)

Gillfab 4709 is a light-weight flooring panel made from unidirectional carbon fiber reinforced epoxy facings bonded to Nomex™ honeycomb core. Gillfab 4709 offers good impact strength, resistance to galvanic corrosion and substantial weight savings.

Work on the G280 program illuminated the value of employing the right products and fabrication techniques in a competitive market. By utilizing the “cut and fold” technique, M.C. Gill Europe was able to limit tooling costs and eliminate the need for oven or autoclave equipment. Work was completed using simple jigs. (Note: parts can be designed to self-jig.) This method is flexible, allowing for custom options and modification as needed and ideal for short runs, bespoke parts and fully repeatable/interchangeable parts.

The BAe, Airbus and G280 programs utilized the “cut and fold” technique, but M.C. Gill Corporation and its subsidiaries are clearly skilled in fabrication and finishing. Vertical integration allows us to combine resources and offer complete design solutions.



Dr. Jack D. Steele *Retires from Advisory Committee*

Dr. Jack D. Steele, an educator and business consultant, joined the Advisory Committee of M.C. Gill Corporation in 1991, providing guidance and applying his business acumen for over 22 years.

Born in Sedalia, Missouri, Dr. Steele received a B.S. degree from Missouri Valley College in 1948, an MBA from the University of Kansas in 1951, and a Doctorate in Business Administration from Harvard University in 1956. Dr. Steele served in the United States Army during World War II and was awarded a Purple Heart and a Bronze Star.

During his storied professional career, Dr. Steele was a tenured Professor at the Stanford Graduate School of Business, the University of Kansas, Professor and Dean of the Texas Tech University School of Business, General Manager of the Xerox Educational Group in New York, and Dean of the Marshall School of Business Administration at the University of Southern California.

Dr. Steele served on many private and publicly held Boards of Directors, including Rohr, Inc.; Golden State Bank; Public Storage, Inc.; Leisure Technology; Dataproducts, Inc.; Golden West Homes; Judy's, Inc.; Air Cal; Purex Corp.; The Foothill Group; Shamrock Acquisition Partners, III; PS Business Parks; and Compensation Resource Group; and Chairman of the Board Services Division of Korn/Ferry International (Los Angeles). Dr. Steele had also acted as a consultant to a number of Fortune 500 companies.

Dr. Steele had been a member of the Los Angeles Economic Council, the Board of Directors of the Red Cross, the Japan-America Society, and the Children's Council of Los Angeles, among others. He has authored numerous books and articles on business and marketing. Dr. Steele's commitment to M.C. Gill Corporation is appreciated and he will be missed.

M.C. Gill Corporation continues to commit resources towards expanding its fabrication and finishing services worldwide. Armed with 67 years of composite manufacturing experience, the proven ability to meet design and specification requirements, and experience working on virtually every commercial aircraft in service, we are ready to address your fabrication and finishing needs.

For more information, please contact us at www.mcgillcorp.com



Dr. Jack D. Steele



M.C. GILL CORPORATION

4056 Easy Street, El Monte, California 91731

phone: 626 443-4022 fax: 626 350-5880

email: info@mcgillcorp.com



Alcore, Inc.
Lakeside Business Park,
1502 Quarry Drive
Edgewood, Maryland
21040 USA
phone: 410 676-7100
fax: 410 676-7050
email: sales@alcore.com
Alcore Overnight™
Expedited Delivery
email: overnight@alcore.com
Alcore does not sell sandwich
panels. Contact M.C. Gill for
these products.



Alcore Brigantine, Inc.
Route de l'Aviation
7, allée Etchecopar
64600 Anglet France
phone/téléphone:
+33 (0) 5 59 41 25 25
fax/télécopie:
+33 (0) 5 59 41 25 00
email: sales@alcorebrigantine.fr



M.C. Gill Corporation Europe Ltd.
23 Enterprise Road,
Balloo Industrial Estate South
Bangor Co-Down
BT19 7TA, N. Ireland
phone: +44 (0) 2891 470073
fax: +44 (0) 2891 478247
email: sales@insoleq.co.uk



Castle Industries, Inc.
of California
601 South Dupont Avenue
Ontario, CA 91761-1502 USA
phone: 909 390-0899
fax: 909 390-0898
email: info@castleindustries.net

www.mcgillcorp.com

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Funny Answering Machine Greetings

"Hi, this is John. If you are the phone company, I already sent the money. If you are my parents, please send money. If you are my financial aid institution, you didn't lend me enough money. If you are my friends, you owe me money. If you are a female, don't worry, I have plenty of money."

"Hi. Now you say something."

"If you are a burglar, then we're probably at home cleaning our weapons right now and can't come to the phone. Otherwise, we probably aren't home and it's safe to leave us a message."

You Know You're Getting Older When...

You criticize the kids of today for their satanic, suicide-inducing music, forgetting that you rocked to Alice Cooper and Black Sabbath.

You turn down free tickets to a rock concert because you have to work the next day.

When jogging is something you do to your memory.

You bought your first car for the same price you paid for your son's new running shoes.

You actually *ask* for your father's advice.

When someone mentions *surfing*, you picture waves and a surfboard.

Trivia

If the government has no knowledge of aliens, then why does Title 14, Section 1211 of the Code of Federal Regulations, implemented on July 16, 1969, make it illegal for U.S. citizens to have any contact with extraterrestrials or their vehicles?

In a study of 200,000 ostriches over a period of 80 years, no one reported a single case where an ostrich buried its head in the sand — or attempted to do so.

- ☐ Barbie's full name is Barbara Millicent Roberts.
- ☐ It is impossible to lick your elbow.
- ☐ A crocodile can't stick its tongue out.
- ☐ A shrimp's heart is in its head.
- ☐ A pregnant goldfish is called a twit.
- ☐ By law, every child in Belgium must take harmonica lessons at primary school.
- ☐ Rats and horses can't vomit.
- ☐ Rats multiply so quickly that, in 18 months, two rats could have over a million descendants.
- ☐ A duck's quack doesn't echo anywhere, and no one knows why.